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An important approach to understanding child behavior and development is the experimental analysis of such behavior. The experimental analysis procedure must be distinguished from related analyses used occasionally. An analysis by anecdote is an analysis based upon the accumulation of recurring associations; for example, B followed by A. This does not assure the existence of a causative relationship. An analysis by correlation is a survey of two anecdotes, (1) if B, then A, and (2) if no B, then no A. But this analysis does not assure that when factors 1 and 2 exist, some factor 3 exists or that both A and B are controlled by C. The experimental method requires that the experimenter manipulate or control A and B in an arbitrary fashion. This reasonably precludes control by some unknown C and reasonably illustrates the causative relationship. The age of a child limits the application of the experimental analysis approach; that is, very young children are generally not available for use in a comprehensively controlled environment. The operant behavior procedure does not require control over a broad range of environmental factors, however, and evidence from such procedures indicates the possibility of investigating child behavior and development through the use of reinforcement, punishment, and extinction contingencies. (WD)

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REINFORCEMENT GROWS UP:

The Experimental Analysis of Behavior as a Systematic Approach to the Teaching of Developmental Psychology

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My course is entitled "Introduction to Child Behavior and Development". It is organized on the premise that students taking it will be unfamiliar with the experimental analysis of behavior. Instead, they are likely to be possessed of a quite vague stereotype about children as fragile, insecure entities, whose behavior is essentially expressive of internally developing attitudes, fears, etc. Many students realize that children go through a great deal of learning. Unfortunately, these students are likely to assume that learning is a trivial process (which they themselves can perform) and therefore requires no systematic discussion. By contrast, they assume that the essential problem of developmental psychology is one of mental hygiene: understanding how tender minds are led astray from the paths of happiness; how they may be led back to the sunlight; and how well educated parents (such as they will be one day soon) can avoid such tragedies.

In answer to this general repertoire, the beginning point of the course is a brief sketch of child-rearing advice of the last half-century. The source is Martha Wolfenstein's review (1953) of the Children's Bureau publication, Infant Care, which is often sent free to new parents by their congressman. The pamphlet contains a good deal of very useful information about the preparation of formula, the folding of diapers, the bathing and dressing of infants, and the art of telephoning the family doctor. It also contains psychological advice on the mental hygiene of infants. Wolfenstein (in her dynamic way) induces four successive phases of basic philosophy about the nature of infants, simply from the detailed advices given to parents in the pamphet since 1914. These phases, in order, have been:

The 1920's: The infant is an erotic creature, possessed of basic sensual drives which, if denied gratification, will diminish, but if indulged, will intensify and ruin the child's subsequent adjustment. The basic problems of infant mental hygiene thus are the prevention of masturbation by mechanical techniques, the prevention of thumbsucking by mechanical and chemical tactics, and the absolute necessity of gradual weaning.

The 1930's: The infant is a dominating creature, possessed of basic drives toward power and domination which, if denied gratification, will diminish, but if indulged, will intensify and ruin the child's subsequent adjustment. The basic problems of infant mental hygiene thus are the multiple bendings of the child to the routines established by his parents. As a result, he is to be fed at rigidly specified hours of the day (whether hungry or not), toilet-trained without fail by his 8th month of life, weaned late but instantaneously, and not allowed to suck his thumb (he may discover it is his to dominate!)

The mid-'40's: The infant is a yearning creature, possessed of two drives: one for affection, the other for exploration. If these drives are not gratified, they will intensify and express

themselves in a wealth of symptoms; if they are indulged, they will be satisfied and good adjustment will be promoted. The basic problems of infant mental hygiene thus are the supplying of frequent demonstrations of love, and the indulgence and promotion of all exploratory behavior. Infants therefore are fed whenever they are hungry and are weaned very gradually and quite late in life; they are toilet-trained late and in a manner which assures them that no one will love them any the less for failure to learn; and if they suck their thumbs or handle their private parts, their parents are to view this as exploration of the immediate environment and be glad.

The mid-'50's: The infant is a potentially dominating creature: he has no strong drive for power at the outset but can easily develop one, if allowed to note the plasticity of his usual environment. The more such a drive is gratified, the more intense it becomes, and this is ruinous to his subsequent adjustment. Consequently, the basic problem of infant mental hygiene is to swindle him into the control of his parents. Swindles are necessary for those problems where the parents might lose, if once the infant sees that there is a battle line to be held. Therefore, he is faded from demand feeding to a rather rigidly timed schedule; he is faded onto his potty more and more often until by accident he happens to urinate and defecate there more and more often; and parents ignore potentially masturbatory behavior, lest the infant perceive that this is something which will arouse them and learn that they are his to titillate.

The student is presented with this historical succession of philosophies and advices, and it is suggested that this may portray a history of folly and fancy rather than the progress of a scientifically oriented discipline toward some basic truths. Naturally, the question arises as to why serious investigation of child development should be so changeable in its basic postulates about children. The answer lies in the nature of the methods available to the student of child development:

The methods of empirical study available to the investigator of child development would seem to be much the same as those available to any scientist. These are based upon observation of events and their surrounding circumstances. A single such observation is, of course, merely an anecdote, and easily susceptible to misinterpretation. The student naturally sees that anecdotes are not to be trusted, since they may too easily portray mere coincidences. However, a few examples are culled from a modern textbook, in which quite dignified "principles" of development are seen to derive from an anecdote or two concerning a European psychologist's own child in interaction with a pillow and a toy.

One defense against coincidence perhaps is the collection of anecdotes in large numbers. If they are mainly similar, the student often suggests, surely they cannot all be coincidences? He is presented with a study of alcoholism and its apparent roots in childhood trauma. A certain research team has published its finding that of some 800 alcoholics interviewed, over 80% of them had been at the extremes of their birth orders, by sex, during their childhood (i.e., they had been the oldest or youngest boy, or the oldest or youngest girl, or the only child, in their family). The students usually decide that despite the uniformity of these many anecdotes, there is nothing to be learned from them, since an examination of themselves as a group, presumably non-alcholic as yet, shows that over 80% of <u>them</u> were at the extremes of <u>their</u> birth orders, by sex, in <u>their</u> families. The student is usually able to see the uselessness of such surveys in the development of a science of child rearing. Nevertheless he is presented with another example or two from current textbooks, such as one solemnly presenting the fact that a large number of juvenile delinquents were found to have been severely toilet trained during their infancy.

At this point, most students will spontaneously generate the method of correlation, and call for "control" observations: surveys of non-alcoholics to accompany all surveys of alcoholics, surveys of non-delinquents to be paired with all surveys of delinquents, etc. This response is met with the usual insincere approval of the operant conditioner, since, after all, it represents the next step in the chain being programmed. However, the student's triumph is allowed a very brief life. The lecturer presents many examples of just such correlations together with a series of questions, all unanswerable, about the <u>direction</u> of cause and effect. There is a study in which it appeared that children who were fed on demand as infants were more secure than children who, as infants, were fed at specified hours of the day. It is agreed that demand feeding might create better adjustment in children than other styles of feeding (incredible as this might be). But it is also suggested that maladjusted infants may be difficult to diagnose as hungry rather than just mad, and thereby may promote a timed schedule of feeding attempts in their mothers. Alternatively, certain sorts of mothers may be the kind who in myriad ways contribute to the good adjustment of their children, and are just the sort who would choose demand feeding as a technique of infant care; while other mothers who unhappily are just the types to fumble most of their opportunities for promoting good adjustment may, in that same general incompetence, let the clock decide when their baby is hungry. Thus, the student suddenly has a number of questions to answer. Does the mother's feeding technique cause the baby's adjustment? Or does the baby's adjustment determine his mother's feeding technique? Or do other, more general factors, determine both the baby's adjustment and the mother's probable choice of feeding technique, the adjustment and feeding technique being otherwise unrelated? In the same atmosphere of puzzlement, the student is told that anxious mothers more often have colicy babies than do placid mothers. Do anxious mothers promote colic in their babies? Or do colicy babies make their mothers anxious? Schizophrenics more often have suffered maternal rejection than normal persons have. Does maternal rejection cause schizophrenia? Or do schizophrenics, perhaps already deviant in their infancy, turn their mothers away from them?

Or are both the mother and child made to behave unfortunately, independently of one another, by factors operating on both of them? Such as shared genes? Or the father-husband of the family? Such examples and their implicit questions are thrown at the students in rapid-fire succession, until each new example is anticipated by the class with the questions pertinant to it. Note that in this argument, there is no need to degrade the measuring techniques of the studies cited (although this would be easy enough). The class takes them at face value, and still cannot settle questions of etiology with them. Instead, more questions of etiology are generated -- but are not answered. Any attempt to answer a correlational ambiguity with a new correlation naturally is treated similarly: the ambiguities implicit in the new correlation are exposed, and the student finds his uncertainty escalating rather than diminishing.

At this point, the experimental method is presented as a formal method of study. Often enough, it has already been suggested by an occasional student with a good science background (probably taking the child development course as a lark, or because of the imminent birth of an offspring). The essence of experimentation, it is said, is to produce rather than gather the same kinds of anecdotes which make a correlation. Thus, it is suggested that an experimental approach to the relationship between styles of feeding an infant and his subsequent adjustment would require that certain infants be assigned to demand feeding conditions while others were assigned to timed schedules of feeding. The assignment would have to be arbitrary and under the experimenter's control, and not a matter of the parents' volunteering their infants for one condition or the other. Later, the infants would have their adjustment assessed (somehow), and if there were any systematic differences, these could be interpreted with far more confidence than the results of the merely correlational study.

This example serves two functions. The first is to provide a context for a generalization by the lecturer. The generalization is presented in abstract terms, as follows: the basic problem of the student of child development is to investigate certain aspects of child behavior, referred to as B, and to discover what prior experiences of the child, referred to as A, are responsible for them. An anecdote is one instance of association between A and B. (For example, Johnny Jones is well adjusted, and was fed on demand as an infant). A survey of similar anecdotes merely allows the statistical statement, "Where you find A, you often find B". (For example, there are 25 well adjusted children in the first grade of Centennial School, and 22 of them were fed on demand as babies.) A correlation is two surveys of anecdotes, one of the form, "Where you find A, you often find B", and the other of the form, "Where you don't find A, you don't usually find B". (For example, of 35 children in the first grade of Centennial school, 22 of the 25 well adjusted children were fed on demand, but only 2 of the 10 maladjusted children were.) An experimental finding is again two collections of anecdotes, but of the form, "Where you create A, you often get B subsequently; but where you prevent A, you rarely get B subsequently". (For example, of 25 babies born in the Centennial area and arbitrarily assigned to demand feeding conditions as infants, 22 showed good adjustment when tested in first grade; but of 25 other babies of the area randomly chosen for assignment to timed feeding

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routines during infancy, only 5 showed good adjustment when tested in first grade.) In the case of an anecdote, there is no use in claiming A as the cause of B: A and B may be associated merely by coincidence. If there are many such anecdotes to be found, there is still no evidence of causation: for all we know, A may as often be associated with the absence of B as with its presence. Even when A and B are correlated, it may be that A is the cause of B, or that B is the cause of A, or, indeed, it may easily be the case that some other factor entirely --call it C -- is the cause of both A and of B, and that A and B have no causal relationship to one another. At this point, in some triumph, a good student will delightedly observe that when A and B are correlated and he can say as well, "I am the cause of A: I set it up in some arbitrarily chosen cases, and prevented it in other arbitrarily chosen cases", then he can conclude with fair reliability that A must be a cause of B. He knows that B cannot be the cause of A, because he is the cause of A; similarly, he knows that there cannot be some other factor, C, which is the cause of both A and B, again because he is the cause of A, and he gets B mainly when he creates A first.

The student' s delight with the essential power of the experimental technique is reinforced at this point. The lecturer wishes it to endure in the student's repertoire. The occasion is also used to point out that experimenters are not the power-mad social reformers or perverters that TV occasionally portrays. They seek to control the A's of the world not to change the world, but to discover with some confidence if a certain A really is a cause of a given B. (Some of them may wish to change the world as well, but this is an individual quirk and not intrinsic to experimenters as a class, the student is told.)

Now, the second purpose of the entire argument emerges: The incredibility of the experiments required to answer some of the questions typical of the usual child development literature. No one can assign infants to a style of feeding; no one can guarantee them anxious mothers; no one can require them to be severely toilet trained; no one can stop the breeding practices of parents so that a given child will remain the youngest boy in his family. Suddenly, the student sees that if Child Development continues to seek out the causes of child development from such events as these, it will remain an essentially non-experimental science. The method of correlation will become the method of possibility, even though it is far from the method of choice. Thus the field will remain in the state of ambiguity and sensitivity to fad appropriate to a discipline in which every new study generates perhaps three radically different interpretations of cause-and-effect mechanisms. Q.E.D.

An obvious next question then becomes: Why continue with the course? Unless the student has some curiosity about the current superstitions of his society in the area of childrearing, wouldn't he be better off learning how to adjust color TV sets? There is an objective science involved there, and he is almost as likely to have a color TV set as he is to have children. At this point, the lecturer offers a promise: There is something to be learned about the development of child behavior, something that can be offered with a modicum of experimentally established proof behind it. The lecturer suggests that first, the student may profit from some understanding of the history of the field, so that he will see why it has been so insistent on locating the significant causes of

child development in such experimentally inaccessible places as the child's genes, his nursing history, his toilet-training, the rejecting practices of his mother, and the like.

As an example of a very influential period in the study of child development, the lecturer presents a brief reading in Freud's theory of psychosexual development (Hall, 1954). A sequence of about 10 days is devoted to as straightforward and objective a presentation as the lecturer can produce, coupled with the reading (written by an enthusiastic author, of course). It becomes clear to the student that such an approach to child development, intriguing though it is, will make it an essentially non-experimentable field. This is so not only because the basic concepts are not defined in terms of observable events, but because even if they were, they refer to times and areas of the child's life which are not open to experimentation by any Western scientist. The student already knows that a non-experimentable discipline is inherently an ambiguous one.

Now, the lecturer begins to fulfill his earlier promise of a demonstrable and effective discipline of behavior development. He remarks on the possibility that not all of the important events determining the course of a child's development are located only in his quite early years and in his parents' most sacrosanct areas of childrearing choices. He remarks on the extensive ability of certain students of behavior to change the current repertoires of experimental subjects quite radically, merely by operating on their behavior--and its consequences -- in their <u>current</u> existence. These investigators, the student is told, rarely consider the subject's previous or childhood experiences to be of any great significance in this change. An equation can be suggested: behavior change is perhaps much the same as behavior development. If the equation has any merit, then the principles of behavior change may well be the principles of behavior development. What are those principles?

At this stage, the lecturer of course presents the principles of operant and respondent behavior. With these students, the concepts of stimulus and response may need some little introduction and ennoblement, followed by elicitation, reinforcement, extinction, punishment, discrimination, generalization, scheduling, deprivation and satiation, and -- especially -- response differentiation, or shaping, and stimulus development, or fading. It is of great help, of course, if examples from child behavior can be used in the development of these terms. Fortunately, a most excellent series of books written by Bijou and one of his colleagues (1961, 1965) is available and aimed exactly at this problem. There are, of course, some programmed texts on much the same material which may be resorted to by those students who find even the most lucid prose an uncertain struggle.

Certain concepts are worth emphasis at this stage. One, for example, is the extreme plasticity of operant behavior implicit in the principles which the student has just learned. Many students find this a pessimistic concept, and therefore an unrealistic one. They would prefer a world in which skills, once acquired, would remain, despite the extinction likely to be programmed for some by an unimpressed environment. Perhaps some students also find it more romantic that childhood learnings be considered a permanent heritage thenceforth, and figure repeatedly in adult destiny with the inevitability of an Aristotelian

design for adequate literary tragedy. The best counter to such wishes is, of course, that they do not square with current experimental experience with behavior. Secondarily -- not logically but often effectively -- it may be argued that it is a better world if behavior is always modifiable: otherwise stupidity, prejudice, and mental illness may have to be considered permanent aspects of life. The student who likes his behavioral science palatable first, and then correct, may be favorably impressed by this tangent, especially if he has any ambitions for changing the unpleasant aspects of his society.

Another point worth some negative emphasis, only because it arises so regularly, is that this discussion is merely a well-dressed treatment of the time-honored technique of bribery. Students will remark that this is certainly an effective technique with some lower types of humanity, but that behavior ought to be studied in its nobler aspects as well. Ordinarily this indictment can be disposed of well enough by inviting a more extensive discussion of those nobler mechanisms of behavior to which the student usually alludes. He may cite honor, love, the self-sacrifice of a parent for a child, etc. In most cases, his fellow classmates will point out for him the social reinforcers possibly maintaining such behaviors, whereupon, with a little explanation, it may become clear that while bribes usually are reinforcers, not all reinforcers are bribes. Some classes will even attempt to list the reinforcers which are bribes. They will often enough arrive at the resolution that a bribe is a reinforcer controlling someone else's behavior which would not have controlled the observer's for the response in question, or -- more cynically -- was not even offered to the observer.

Still another point is the natural objection to operant principles as techniques of control, hence of unfair influence of others, even of enslavement. In answer, it may be remarked that the laws of nuclear fission are no less true simply because they are dangerous to our survival if we know them; similarly, what appear to be dangerous laws of behavior cannot be any less true if we know them, too. It may be suggested to the student that perhaps he would prefer that no more be found out about the development of behavior. That is certainly his privilege; but the course is going to expound only what is already known, and well known, and hence is hardly compounding the risks of existence. The lecturer is usually allowed to proceed. (Indeed, it would be interesting to see if the class, at this point, would let him stop if he appeared worried by the social consequences of the next lectures.)

Recall that the student was promised an experimentally supported set of principles relevant to behavioral development. The extreme wealth of experimental support for these principles at the animal level is of course alluded to quite often. However, in the process of presenting these principles, the lecturer makes repeated use of the now plentiful experimental demonstrations involving children. There is special emphasis on studies involving "real life" behaviors such as tantrums or reading skill, rather than the more elegant but perhaps more "artificial" bar-pressing responses of the child laboratory. At first the students are likely to respond to these examples as interesting cases helpful in understanding the concepts being presented. Subsequently, however, the lecturer is able to point back to these studies as some of the experimental demonstrations on which he said he could rely. Fortunately, a new volume of

the prevously cited series by Bijou and his colleague (1967) reprints a collection of studies quite useful to this part of the program. (There are other collections of such articles which could be used).

The lecturer now admits that even in this approach to child development, if a complete account of development is to be approached, some guesses must be made. However, these guesses are presented after a fairly intensive account of nursery school research, ongoing by the preschool staffs of the Universities of Washington and Kansas, in which the social reinforcement of the teachers is used to modify behaviors of individual children in desirable ways. Experimental examination of the process is a uniform part of all such studies, the student sees. Furthermore, the list of child behaviors successfully handled by such techniques is impressive: regressed crawling, excessive crying, tantrums, aggression, lack of social interaction, low rates of verbal behavior, excessive choice of a single playmate, passivity, hyperactivity, excessive dependence, and even initial non-responsiveness to teacher-presented social reinforcement. After this list of experimental demonstrations, the student is usually willing to forgive a few guesses on the lecturer's part. (Some students, depending on their prior training in the social sciences, may even feel that the lecturer has not truly gained the heights of science unless he makes some statements which could not possibily be proved.)

The guesses center on the mechanisms of early shaping. The lecturer notes that he must guess at many of the stimuli which could have reinforcing function for the child, since experimental demonstrations are not available. He must also guess at the likely contingencies with the infant's behavior into which such stimuli enter. He can deduce the development of a vast repertoire of motor skill thereby, and can present the student with an alternative to the widely held view that much of the child's motor competence simply emerges, presumably as a gift of his genes. (The student has learned previously that there are no experimental breeding studies involving children, and that the twin studies are competent to show the role of experience but incompetent to show the role of heredity.) The lecturer's guessing includes the function of the infant's caretaker. She is seen as a stimulus probably discriminative for quite a few reinforcement contingencies, and thereby as the origin of the social reinforcers shown to be so effective for at least the nursery school child.

However, the lecturer must not forget that his students came with a predisposition to have child development concentrate on personality development, and furthermore to offer them some simple formulae for being "good" parents. The course so far has implied that it will be a good deal of work to raise the ideal child: it will require designing a multitude of contingencies constantly appropriate to new problems. This point may be established still more firmly, and an even more fundamental discussion may be approached, by considering some traditional studies of personality development. One useful example is the classic description of "dominating" and "submissive" parents available in most modern textbooks, along with the catalogue of behaviors their respective children are supposed to show. The original description of these parent types is read out to the class verbatim. Many students wisely remark that they know just the sort of parents being described. The lecturer requests a more specific description

of these types, however. He cites everyday family problems and asks for the probable response of each parent type. (For example: the 7 year old daughter of the family wishes to sleep at a playmate's house one night. Will the dominating parent allow this? Will the submissive parent allow this? Or, the five year old child refuses to eat his peas at supper. How will the dominating parent react? The submissive parent?) Invariably, the class will begin to answer these questions with great confidence, only to discover that they disagree severely among themselves. It usually becomes clear that everyone's standard of dominance and submission is relative to his own behavior (which is neither dominant nor submissive, but, of course, rational). The lecturer now can point out that the actual behaviors of these parent types are not known. Furthermore, so far as the principles of behavior currently under study are concerned, behavior is not shaped by either "dominance" or "submission", but by reinforcement, punishment, and extinction contingencies. If there are types of parents, they should be described in terms of their typical use of these procedures, and not in the terms of a novelist. Finally, the students are directed toward the specifications of the children's behaviors. These specifications invariably take the form of traits which various observers have said the children possess. Children of dominating parents, for example, often are said to be "courteous". The class is asked to consider what this must mean. The lecturer means to develop the concept of <u>response class</u> out of this discussion.

He begins with an absurdity, just for the ease of starting the program. He remarks that there is not a "courtesy" bar located here and there in the world, the pressing of which constitutes behavioral "courtesy". Instead, courtesy is manifest in a variety of behaviors: the use of words like "Please", "Thank you", "You're welcome", certain behaviors appropriate to eating at the table in the company of others, the holding of doors for ladies, and many others. The idea of a <u>class</u> of behaviors is developed, all members of which may take the name "courtesy". But the lecturer is not content. He suggests the case of a certain teen-age boy, who, if observed in everyday life, would show many of these behaviors. However, the facts of this boy's case are the following: He is reliable in the use of verbal courtesy because his mother reinforces such behavior with her approval. He uses his silverware, napkin, and mouth correctly at the table because his grandmother (who lives with him) nags him interminably every time he fails to do so. He holds open doors for ladies and allows them to precede him here and there because his father has told him it is a part of good seduction technique. In terms of the responsible reinforcement contingencies, the "courteous" young man actually is three young men: a maternal approval seeker, grandmaternal disapproval avoider, and a sexual hopeful. Should grandmother leave home, for example, one component of the young man's apparent courtesy would extinguish quite promptly (if no one else reinforces it); but the other components would remain. The lecturer thus objects to calling the boy "courteous", if the label is to mean a single trait. The boy functionally possesses three traits in this example, but the observer sees their topography--their physical form -- as one. For the <u>observer</u>, perhaps, all these behaviors are a unified class; for the boy, they are three classes.

Two generalizations emerge. One is that the observation of behavior and the coding of it into such categories as "courteous", or "aggressive", or "self-

reliant", testifies only to the observer's behavioral history. There is no guarantee at all that the observer's categories constitute a functional organization of the subject's behavior. The other generalization is fundamentally the same point: that the topography of behavior is one of its least important characteristics, and that the function of behavior is one of its most important. That is, what behavior looks like is relatively unimportant except to the observer (whose behavior we are not trying to explain); what behavior accomplishes by way of consequences is all-important in understanding its existence and its future.

This fundamental thesis has been reinforced during the course in another way. The class, despite the fact that it numbers between 100 and 200, has been organized into shifts and filtered through the university's nursery school over a period of weeks. Each student observes children at play for perhaps half an hour. The teaching assistant attached to the course assigns these observations and requires a written summary of them. The written summaries, at first, are interpretive in the extreme. Large numbers of the nursery school's children are despairingly classified as fearful, jealous, dominating, hostile, regressive, withdrawn, schizoid, and even Oedipal (a common suggestion by English majors). The descriptions are handed back to the student with appropriate punishment, usually rendered in the form of a request for substantiation. When possible, the student is asked what sort of further observations could establish the correctness of the interpretation. Those interpretations that could not possibly be observed to be correct thus tend to decrease in rate, while the heavily reinforced descriptions which cite the simple topography of the behavior and its stimulus antecedents and consequences appear more and more. Presently some students can even design the experimental manipulation of teacher or child responsiveness to the observed child which would demonstrate to them what is supporting the child's behavior. <u>That</u> is considered the desired terminal behavior of such a course. The student who emerges thus is ready for the laboratory courses hopefully held out before him as "next". Their description is another report.

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